Laboratory Standard Operating Procedure for:

Corrosive Chemicals

Description

This standard operating procedure outlines the handling and use of corrosive chemicals. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling corrosive chemicals.

Potential Hazards

Corrosive chemicals can cause destruction of living tissue by chemical action at the site of contact and can be solids, liquids, or gases. Corrosive effects not only can occur on the skin and eyes, but also in the respiratory tract and, in the case of ingestion, in the gastrointestinal tract as well. While acids and bases are familiar corrosives, many other materials are corrosive to the body as well (including bleach and phenol).

Review the Safety Data Sheet (SDS) of the material to determine if it is corrosive and to identify other hazards. If the material also has other physical hazards or health hazards, follow those appropriate SOPs as well.

Refer to SOP templates for **hydrofluoric acid**, **perchloric acid**, **phenol**, *and* **bleach**.

Acutely toxic and reactive acids meeting the MIOSHA definition of a ***Particularly Hazardous Substance*** *(see below) require customized SOPs with principal investigator approval that incorporate their toxic and/or reactive hazards.*

NOTES:

The University of Michigan-Dearborn's Chemical Hygiene Plan requires specific measures to take in order to ensure laboratory employee protection, including provisions for additional employee protection for work with Particularly Hazardous Substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity, e.g., hydrogen cyanide, hydrogen sulfide, and nitrogen dioxide.

Specific consideration shall be given to the following provisions which shall be included where appropriate for each **Particularly Hazardous Substance**:

A. Establishment of a designated area;
B. Use of containment devices such as fume hoods or glove boxes;
C. Procedures for safe removal of contaminated waste; and
D. Decontamination procedures.

General guidelines and recommendations for the safe handling, use and control of hazardous chemicals and particularly hazardous substances can be found in a chemical's SDS and in other chemical hazard references.

Engineering Controls

Where the eyes or body of any person may be exposed to corrosive chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. *Bottle type eyewash stations are not acceptable.*

A safety or drench shower should be available in a nearby location where the corrosive material is used.

Depending on the material's pH or based on its ability to cause severe tissue damage, e.g., formaldehyde, methylene chloride, methyl ethyl ketone peroxide (MEKP), phenol, etc., the location of the emergency shower and/or emergency eyewash shall be within **25 to 100 feet from the hazardous operation**.

Manipulation of some corrosive materials outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to corrosive materials in the laboratory and are the preferred ventilation control device.

Work Practice Controls

Segregate the various types of corrosives. Separate acids and bases. Liquids and solids should also be separated. Specially designed corrosion resistant cabinets should be used for the storage of large quantities of corrosive materials. Store corrosives on plastic trays. Do not store corrosive materials on high cabinets or shelves.

Nitric acid should be stored in secondary containment in a well-ventilated area that is separated from organics and other combustible materials and incompatibles. Also refer to the SOPs for hydrofluoric acid, nitric acid, picric acid and sulfuric acid.

Containers: All corrosive chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

NOTES:

Employers may choose to label secondary, portable or in-house workplace containers with label alternatives that meet the requirements for the new Hazard Communication Standard (HCS). Alternative labeling systems such as the National Fire Protection Association (NFPA) the Hazardous Material Information System (HMIS) are permitted for workplace containers. However, the information supplied on these labels must be consistent with the revised HCS, e.g., ***no hazard warnings or pictograms that conflict with GHS.***

Personal Protective Equipment (PPE)

In order to select the appropriate PPE for the workplace, a hazard assessment is conducted. The hazard assessment determines the hazards and potential hazards associated with a task, machinery, or process. The appropriate PPE for the situation may be subsequently determined.

The Hazard Assessment Form may be found in Appendix A of EHS's Personal Protective Equipment (PPE) Guideline. It may be completed either by the workplace supervisor or the department's OSEH representative.

Eye protection in the form of safety glasses must be worn at all times when handling corrosive materials. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the ***American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*** **(ANSI/ISEA Z87.1)** and must be equipped with side shields (that also meet the requirements of ANSI/ISEA Z87.1). Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn. It is recommended that face shields be worn when a splash potential exists with corrosive materials.

Gloves must be worn when handling corrosive chemicals. Disposable nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. Below are some glove material recommendations for some common acids.

Acid	Recommended Glove Materials[1]
Acetic Acid	• Butyl (Unsupported) • Latex (Unsupported Natural Rubber) • Neoprene • Nitrile (Unsupported) • Polyvinyl Chloride (PVC)
Hydrochloric Acid	• Butyl • Neoprene • Nitrile • Polyvinyl Chloride (PVC)
Nitric Acid	• Butyl • Natural Rubber • Neoprene
Phosphoric Acid	• Natural Rubber • Neoprene • Nitrile • Polyvinyl Chloride (PVC)
Sulfuric Acid	• Butyl • Neoprene • Polyethylene • Polyvinyl Chloride (PVC)

1. The recommendations above are based on typical laboratory concentrations and uses. Refer to the acid's SDS as well as the Glove Compatibility Charts located on EHS's Glove Use webpage for each particular concentration of acid for additional recommendations, especially for unusual concentrations or use of a particular acid.

Lab coats, long pants, closed toed shoes and long sleeved clothing should be worn when handling corrosive materials. Additional protective clothing should be worn if the possibility of skin contact is likely.

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of corrosive materials which pose this risk should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

Transportation and Storage

- Transport corrosives in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
- Store in well-ventilated areas with secondary containment, such as a non-reactive plastic bin.
- Store below eye level.
- Store away from metal (unless the metal has a corrosion-proof coating), and do not store under the sink.
- Store away from incompatibles – many corrosive materials are incompatible with each other – oxidizing acids are incompatible with organic acids, and acids are incompatible with bases. Review the chemical's Safety Data Sheet (SDS) for additional incompatibility information.
- Avoid storing on the floor. If storing on the floor is necessary, use secondary containment.

Waste Disposal

Because most spent, unused and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. ***Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers.*** Contact EHS at (313) 593-0921 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to EHS's Hazardous Waste Webpage for more information.

Exposures/Unintended Contact

If the employee is in need of emergency medical attention, call 911 immediately.

Personnel: Immediately flush contaminated area with copious amounts of water after contact with corrosive materials. Remove any clothing and/or jewelry to facilitate removal of chemicals. If a delayed response is noted report immediately for medical attention. Be prepared to detail what chemicals were involved.

If the incident involves **Hydrofluoric acid (HF),** seek immediate medical attention. Also refer to EHS's Hydrofluoric Acid SOP.

If there is any doubt about the severity of the injury, seek immediate medical attention.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the Illness and Injury Report Form. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

Complete the EHS Laboratory Incident and Near-Miss Report form.

Health Care Providers
Medical consultations and examinations for employees are provided via:

Concentra Medical Center
17500 Federal Drive, Ste. 750
Allen Park, MI
Phone: 313-982-1376
MON – FRI: 8:00am – 5:00pm

Concentra Medical Center (After Hours and Non-Emergency)
11700 Metro Airport Center Drive, Ste. 104
Romulus, MI
Phone: 734-955-7000
24 hours – 7 days a week

Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)*
19401 Hubbard Drive
Dearborn, MI 48126
Phone: 313-928-8278

Click here for more information.

Spill Procedures

Area: Decontamination procedures vary depending on the material being handled. The corrosivity of some materials can be neutralized with other reagents. Special neutralizing agents should be on hand to decontaminate areas.

- When a spill occurs, ***personal safety should always come first***.
- Alert and clear everyone in the immediate area where the spill occurred.
- Use proper personal protective equipment (PPE) as noted above.

A **minor (small) chemical spill** is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel, i.e., (*less than 1 liter*). A **major/large chemical spill** requires active assistance from emergency personnel.

Additional Spill Response Steps:

MINOR CHEMICAL SPILL

- Alert people in immediate area of spill.
- If spilled material is flammable, turn off ignition and heat sources. Don't light Bunsen burners or turn on other switches.
- Open outside windows, if possible.
- Use proper personal protective equipment (PPE) as noted above.
- Avoid breathing vapors from spill.
- Confine spill to as small an area as possible.
- **Do not wash spill down the drain**.
- Use appropriate spill kits/sorbents to neutralize corrosives and/or absorb spill. Collect contaminated materials and residues and place in container. For powdered chemicals sweep carefully to avoid generation of dust or, if appropriate, use moist sorbent pads or wet the powder with a suitable solvent and then wipe with a dry cloth. Contact EHS at (313) 593-0921 for proper disposal.
- Clean spill area with water.

MAJOR CHEMICAL SPILL

Report large chemical spills in corridors or common areas, e.g., hallways, elevators, eating areas, rest rooms, offices, etc., to Public Safety at (313) 593-5333 or 911 from a campus phone.

- Attend to injured or contaminated persons and remove them from exposure.
- Alert people in the laboratory to evacuate.
- If spilled material is flammable, turn off ignition and heat sources. Don't light bunsen burners or turn on other switches.
- **Call Public Safety at (313) 593-5333 or 911 from a campus phone immediately for assistance.**
- Close doors to affected area.
- Post warnings to keep people from entering the area.
- Have person available that has knowledge of incident and laboratory to assist emergency personnel.

Additional Spill Links:

- Chemical Spill Control Information

Report all emergencies, suspicious activity, injuries, spills, and fires to Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn Emergency Alert System.

Training of Personnel

All personnel are required to complete the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*). Furthermore, all personnel shall read and fully adhere to this SOP when handling corrosive chemicals.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? ☐ **YES** ☐ **NO**

Principal Investigator _____ **Revision Date** _____